Drafting and Design Presentation Standards
Volume 3: Structural Drafting Standards

Chapter 13: Provision for Bridge Jacking, Inspection and Maintenance

May 2013

Queensland Government

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Chapter 13 Amendments

Revision register

Issue/Rev No.	Reference Section	Description of Revision	Authorised by	Date
1	–	First Issue.	Manager (Structural Drafting)	April 2011
2	–	Document name change.	Manager (Structural Drafting)	Nov 2011
	13.3	Stainless steel marker plates to be Grade 316. Amend Figure 13.3-1 to show that threaded rod may replace the bolt.		
	13.4	Saw cut bitumen wherever it continues over a fixed or continuous joint. Deck unit holding down bolt recess depth increased to 55 mm. Slotted holding down bolt hole moved to 240 mm from end of deck unit. The distance from deck unit holding down bolt hole to the end of the deck unit increases on skewed bridges. Update all Figures.		
3	13.3	Figure 13.3-1 Holding down bolt note revised.	Team Leader (Structural Drafting)	May 2013
	13.4	Figures 13.4-1 to 13.4-7 incl. revised.		
	13.7	Abutment Protection – wording paragraph 3. Figures 13.7-2, to 13.7-5 incl. revised.		
	13.8	Figure 13.8-1 revised		

Contents

13 Provision for Bridge Jacking, Inspection and Maintenance

13.1 Glossary of terms

For a complete glossary of terms refer Chapter 1 – *Introduction.*

13.2 Figures and examples shown in this volume

The figures and examples shown in this volume are for presentation purposes only, and may contain some details that are now superseded. These details have been included for ease of reference, to illustrate typical solutions, and to show the required standard of drafting presentation. The details are not to be used without an engineering check and certification by a Structural RPEQ to confirm that the details are appropriate for the specific project.

13.3 Deck Unit Bridge Provision for Jacking

Deck Unit Bridges

Abutment and pier headstocks on a deck unit bridge must incorporate jacking shelves wherever there are elastomeric bearings. Because these bearings have a limited service life, provision must be made to jack the span and replace the bearings. The shelf will also be used to support temporary packers when the bearings are being installed.

Typically, the shelf shall be 250 mm deep and 325 mm wide for bridges with deck units. To stop the edge of the jacking shelf from breaking away during jacking, the jack must be located at least 175 mm from the outside of the headstock. The jacking shelf may need to be larger for other bridge types; that is, box girders.

Similarly, the bearing must sit at least 175 mm from the edge of the bearing shelf on a square bridge. On a skewed bridge this distance may be reduced because only one corner of the bearing is located closer than 175 mm. There jacking position must not be under a void in the deck unit.

Elastomeric bearings are used on a headstock in following instances:

- bridges with a concrete deck
- the expansion joint end of a span
- deck units longer than 20 m, even if there is no concrete deck and/or expansion joint.

Marker Plates (Stainless Steel Grade 316)

Stainless steel marker plates shall be placed above the deck unit holding down bolt nuts wherever the nuts have been designed to be removed prior to jacking. The marker plates shall be attached to the deck unit/deck with ‘Parchem Roadseal SL’ silicone or approved equivalent.

Polyethylene Sheet

At bridge piers without an expansion joint or a concrete deck, a 5 mm thick sheet of closed cell expanded polyethylene shall be placed between the ends of the deck units on adjacent spans. The remaining 45 mm of the 50 mm nominal gap shall be filled with 1:3 mix cement mortar. To prevent the mortar from spilling out at the bottom of the joint a strip of compressible filler shall be attached to the pier headstock with epoxy adhesive. The polyethylene sheet is used to allow for rotation of the deck units and to reduce friction when jacking because only one span of deck units is jacked at a time.

100 mm Diameter PVC conduit

Bridges with deck units and a concrete deck require that provision is made for a portion of the deck to be removed above the deck unit holding down bolts so that the bolts can be accessed. This is achieved by placing a 100 mm diameter PVC conduit above the bolt and filling it with N20/5 concrete. The contents of the conduit can then be easily removed before the bridge is jacked.

Bearings

At fixed and continuous joints the holding down bolts are designed to withstand all forces along the bridge (hence M30 Class 8.8 bolts are used). Large shear forces are applied to the bolts, so to prevent them from breaking, the gap between the top of the headstock and the bottom of the deck unit is limited to 15 mm. To prevent elastomeric bearings from moving, they are seated in a 10 mm deep recess. Therefore the bearing thickness is limited to 25 mm.

At expansion joints the holding down bolts are not subjected to the same shear forces. Therefore there is no upper limit to the bearing thickness.

Holding Down Bolt Size and Grout Type

Bridges without provision for jacking have their deck units held down with M24 Class 4.6 bolts bonded by 1:2 mix cement grout. Bridges with provision for jacking use M30 Class 8.8 holding down bolts bonded by ‘Parchem Conbextra GP’ cementitious grout or approved equivalent.

On bridges where provision for jacking is required on at least one pier or abutment, the M30 Class 8.8 bolts and ‘Parchem Conbextra GP’ grout shall be used over the entire bridge length to avoid confusion. To ensure that the ‘Parchem Conbextra GP’ grout sets to the required strength, it must be mixed to fluid consistency to the manufacturers specifications.

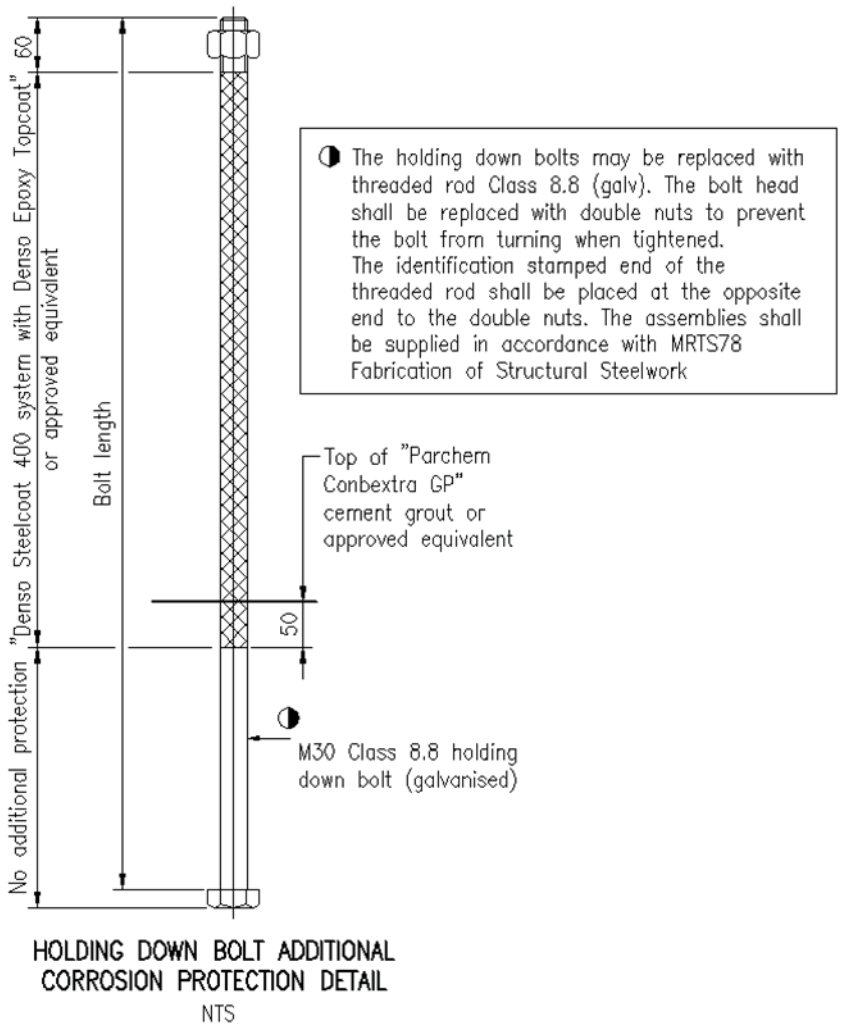
The bolts may be replaced with threaded rod. Refer Chapter 11 – *General Arrangements, Deck Unit Anchorage Details*.

Holding Down Bolt Corrosion Protection

Holding down bolts for deck units that are to be jacked at one or both ends shall be given additional corrosion protection because the full length of the bolt is not encased in grout. In addition to hot dip galvanising, the bolts shall be treated with the ‘Denso Steelcoat 400 system with Denso Epoxy Topcoat’ or approved equivalent. The additional protection shall start 50 mm from the top of the bolt and extend 50 mm into the ‘Parchem Conbextra GP’ grout which holds the bolt down. Refer Figure 13.3-1 *Holding Down Bolt Additional Corrosion Protection*.

Where the nut and washer at the top of bolt are designed to be removed before jacking, they shall be coated with grease before a silicone seal is placed around them.

Figure 13.3-1 Holding Down Bolt Additional Corrosion Protection



Silicone Seal

At fixed and continuous joints, a 50 mm deep silicone plug is installed at the top of the deck unit holding down bolt hole to stop water from ponding above the 'Parchem Conbextra GP' grout at the bottom of the deck unit holding down bolt hole. A fibre washer is installed to contain the silicone before it is placed. The washer shall be a 68 mm diameter x 0.8 mm thick non-asbestos fibre washer with a 32 mm diameter hole placed centrally.

At all joints the nut and washer for the holding down bolt are covered with grease before the holding down bolt hole recess is filled with silicone. The grease is applied to allow the nut and washer to be easily removed prior to jacking. The silicone is used to prevent moisture from seeping down through the concrete deck and/or DWS and ponding on the holding down bolt washer/expansion joint washer.

The silicone shall be 'Parchem Roadseal SL' or approved equivalent. On bridges without a concrete deck, the DWS will be applied directly onto the silicone, therefore the silicone must be heat resistant to 180ºC.

Deck Unit Bridges with a Concrete Deck without DWS

The method of locating all of the holding down bolts with a 100 mm diameter PVC conduit does not suit a bridge with a concrete deck without DWS because vehicular traffic will damage the concrete

plug. Instead, only the outer deck units shall have their holding down bolt holes marked with the conduit. The intermediate holes can be located and by measuring from the outer holes. The concrete plug can then be removed so the holding down bolts can be accessed. Marker plates are not placed above the conduits in this instance.

Deck Unit Bridges with Cast Insitu Kerbs and without a Concrete Deck

The holding down bolt holes in the outer deck units will be covered by the cast insitu kerbs. The kerbs shall be broken back if the bridge needs to be jacked, and reinstated once the maintenance is complete. This shall be noted in the Bearing Replacement Procedure Notes, refer 13.8 *Bridge Jacking, Inspection and Maintenance Drawing*.

13.4 Deck Unit Bridge Joint Types

General Arrangement drawings show a view detailing the deck unit bridge joint details. The view is titled ANCHORAGE DETAILS. Refer Chapter 11 – *General Arrangement Drawings, 11.7 Detailed Design General Arrangement Drawings* for further explanation and to Chapter 11 – *General Arrangements, Figure 11.7.2 Deck Unit Anchorage Detail – Provision for Jacking* for an example of the details required.

There are several types and combinations of joint types. Additional details are as follows (note that these details shall be modified when the bearings are placed in front of the deck unit holding down bolt holes).

Fixed Joints – DWS on Deck Units >20m

At fixed joints the ‘Parchem Conbextra GP’ grout shall be placed in the headstock formed holes and the bottom 250 mm of the deck unit holding down bolt holes. The entire lengths of the holes are not filled because when the grout is removed at the time of jacking it will create unnecessary additional work. Refer Figure 13.4-1 *Fixed Abutment and Pier Joints – DWS on Deck Units >20 m*.

Expansion Joints – DWS on Deck Units

At expansion joints the ‘Parchem Conbextra GP’ grout is only placed in the headstock formed hole. Grout is not placed in the slotted deck unit holding down bolt holes because the holding down bolt must be free to slide along the slot. Refer Figure 13.4-1 *Fixed Abutment and Pier Joints – DWS on Deck Units >20 m*.

Fixed Abutment Joints with Bearings

When deck units are supported by bearings at fixed abutment joints, an XJS expansion joint (or approved equivalent) shall be provided in the DWS. Refer Chapter 17 – *Cast Insitu Kerbs and Decks, Appendix A Deck Design Sketches – Sheet 6*.

Combination of Fixed and Expansion Joints – DWS on Deck Units <20 m

A deck unit bridge without a concrete deck and with spans lengths 20 m or less will only have elastomeric bearings at expansion joints. This means that the deck units will only need to be jacked at the expansion joint end. At the fixed end, a jacking shelf is not needed, however, provision must still be made to disconnect the holding down bolts to allow the deck units to rotate as the expansion joint end is jacked. The deck units will be supported on 1:3 mix cement mortar and be grouted 250 mm into the deck unit holding down bolt holes. Refer Figure 13.4-3 *Expansion Abutment Joint and Fixed Pier Joints – DWS on Deck Units ≤20 m* and Figure 13.4-4 *Fixed Abutment Joint and Expansion Pier Joints – DWS on Deck Units ≤20 m*.

Similarly, if the bridge has an expansion/fixed pier the fixed side shall be fully grouted with 'Parchem Conbextra GP' for the full length of the pier headstock formed holes and the deck unit holding down bolt holes. Refer Figure 13.4-5 *Fixed Abutment Joint and Expansion/Fixed Pier Joint – DWS on Deck Units ≤20 m*.

Fixed and Continuous Joints – DWS on Concrete Deck on Deck Units

At continuous joints, the deck units on one span of the pier headstock shall be grouted 250 mm while the deck units on the adjacent span shall only be grouted into the pier headstock formed holes. Only one side is grouted so that the 50 mm nominal gap between the deck units can close up as the deck units are placed under load. The side of the pier headstock in which the deck units are grouted 250 mm shall be consistent along the entire bridge length. Refer Figure 13.4-6 *Fixed Abutment and Pier Joints – DWS and Concrete Deck on Deck Units*.

Expansion Joints – DWS on Concrete Deck on Deck Units

At expansion joints the 'Parchem Conbextra GP' grout is only placed in the headstock formed holes. Grout is not placed in the slotted deck unit holding down bolt holes because the holding down bolt must be free to slide along the slot. Refer Figure 13.4-7 *Expansion Abutment and Pier Joints – DWS and Concrete Deck on Deck Units*.

Figure 13.4-1 Fixed Abutment and Pier Joints – DWS on Deck Units >20 m

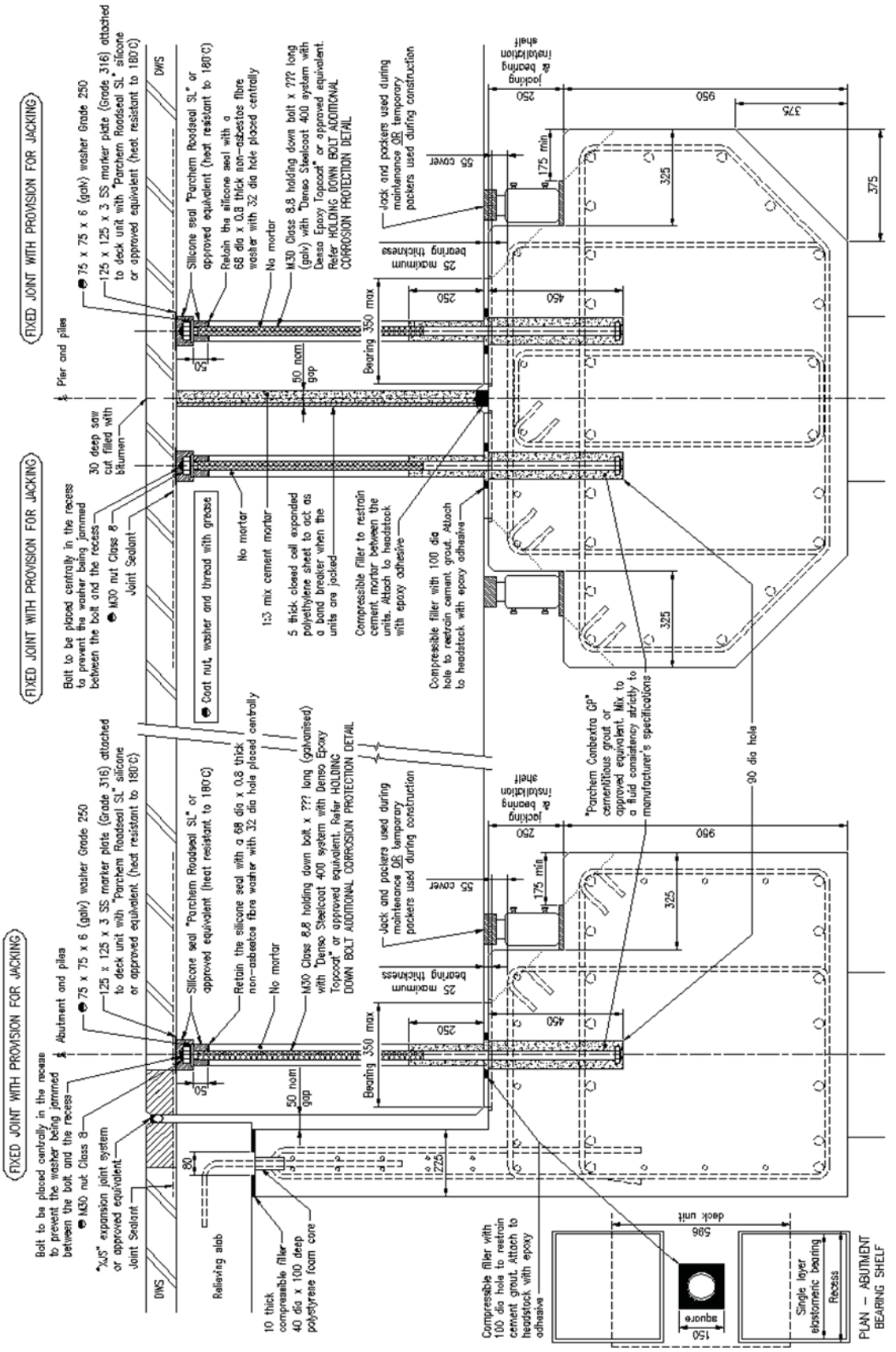


Figure 13.4-2 Expansion Abutment and Pier Joints – DWS on Deck Units

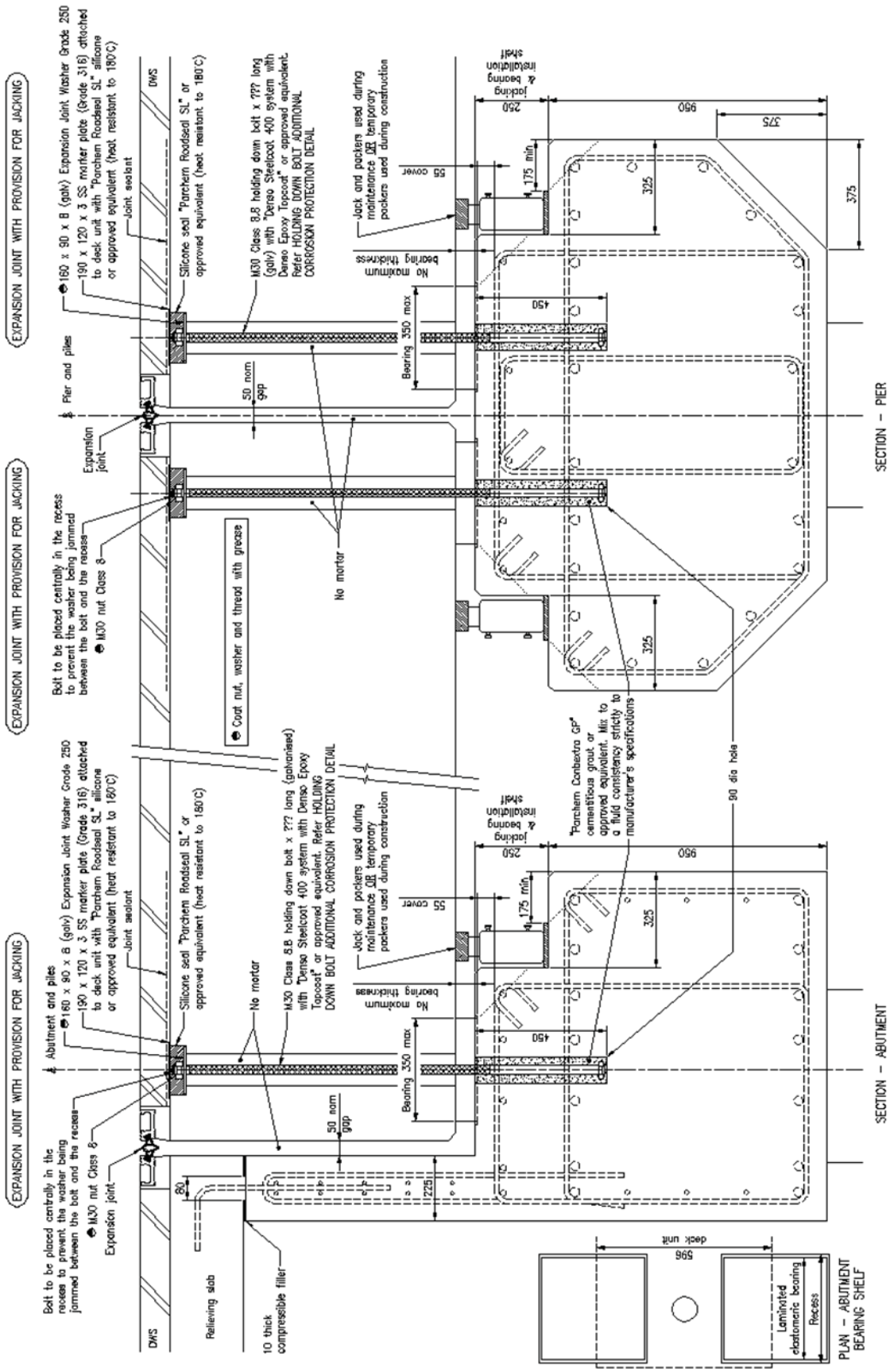


Figure 13.4-3 Expansion Abutment Joint and Fixed Pier Joints – DWS on Deck Units ≤20 m

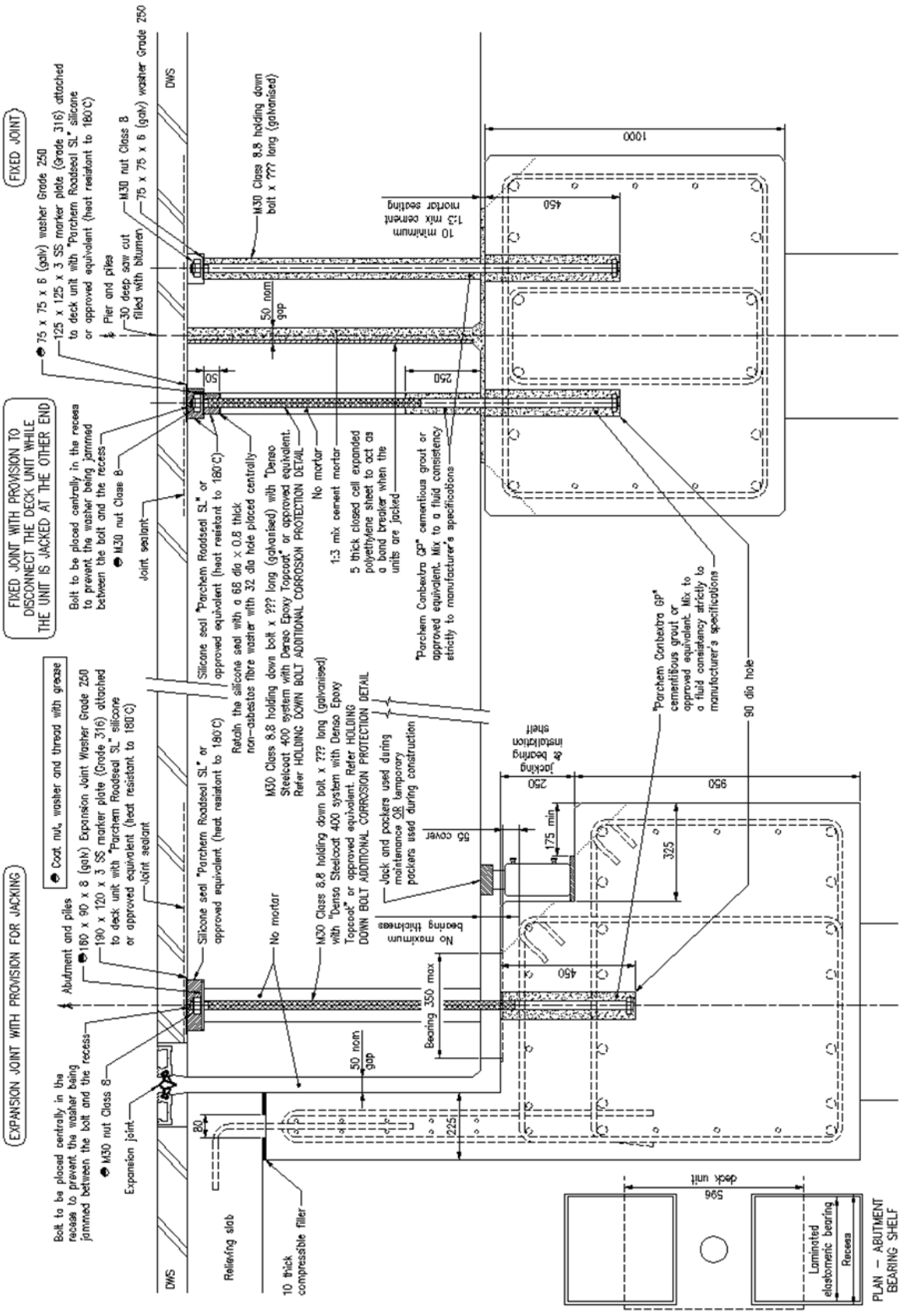


Figure 13.4-4 Fixed Abutment Joint and Expansion Pier Joints – DWS on Deck Units ≤20 m

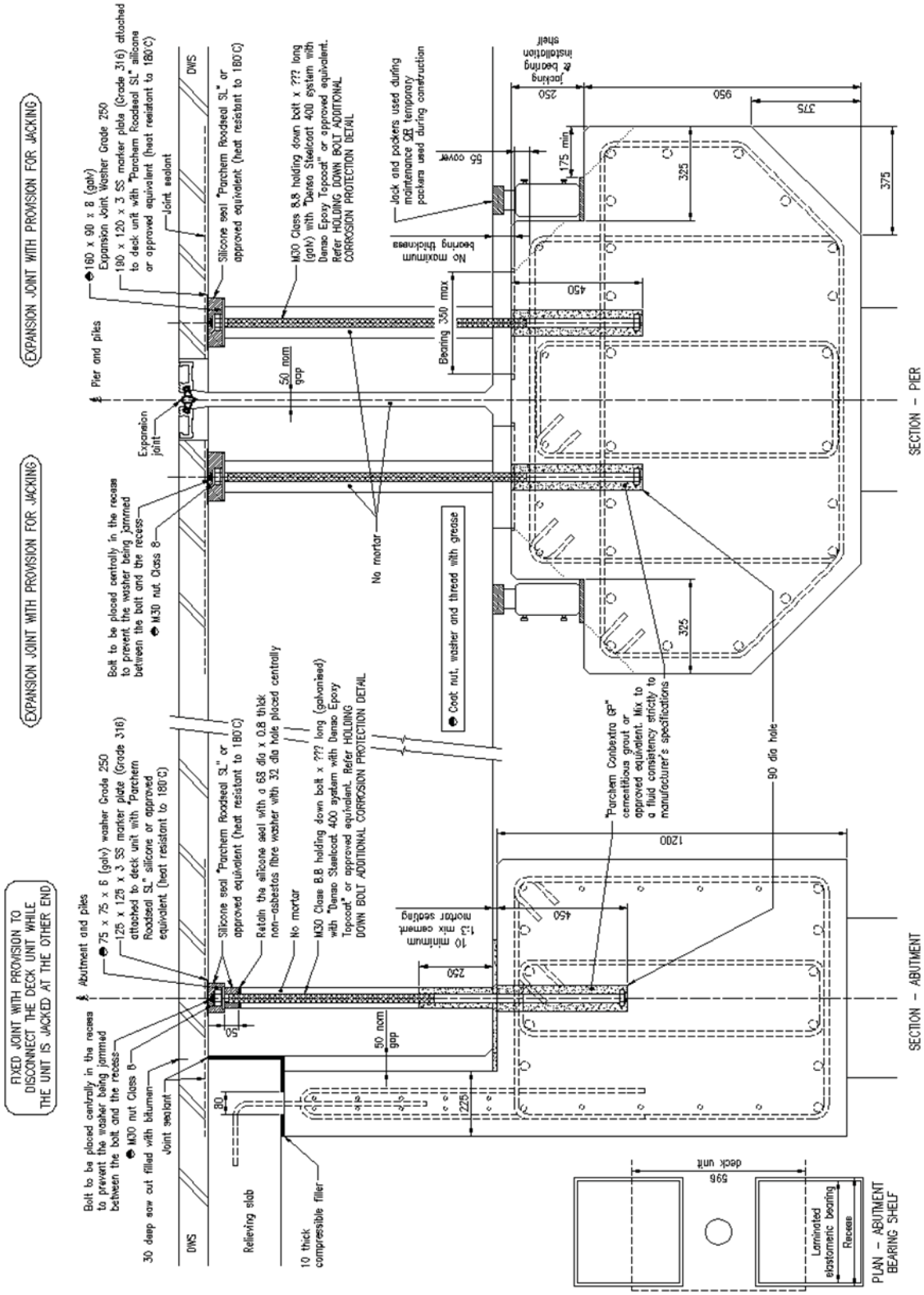


Figure 13.4-5 Fixed Abutment Joint and Expansion/Fixed Pier Joint – DWS on Deck Units ≤20 m

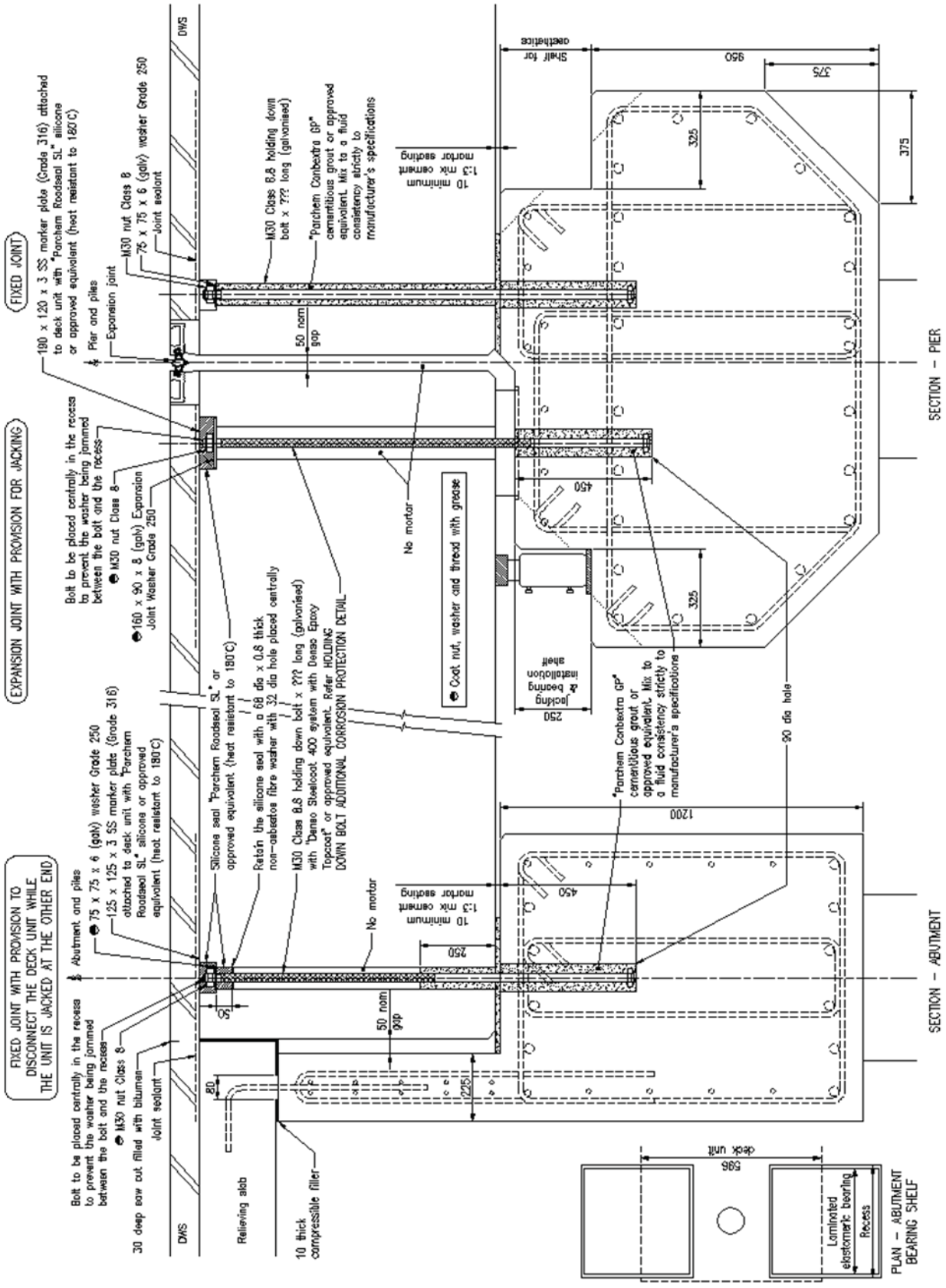


Figure 13.4-6 Fixed Abutment and Pier Joints – DWS and Concrete Deck on Deck Units

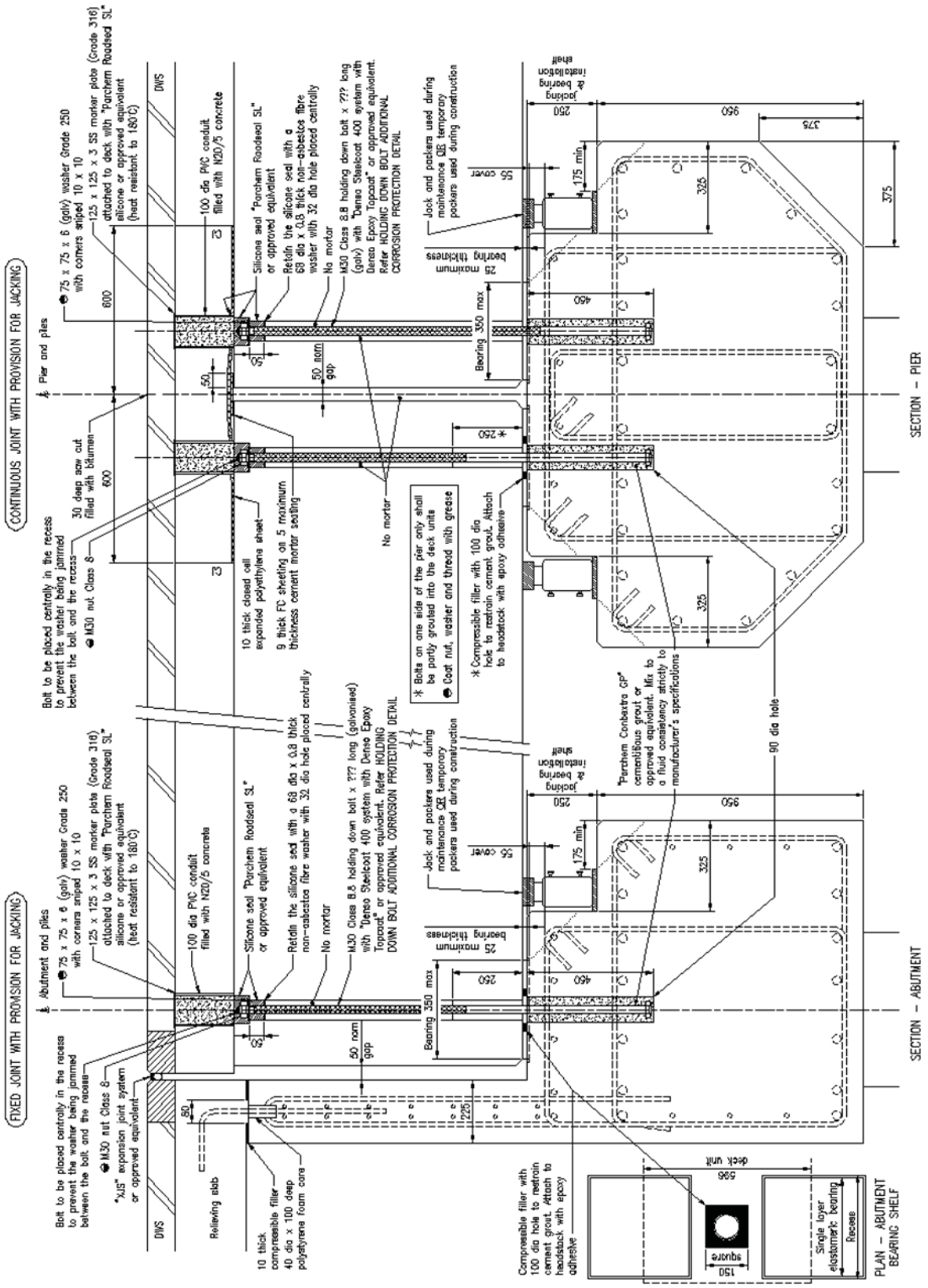
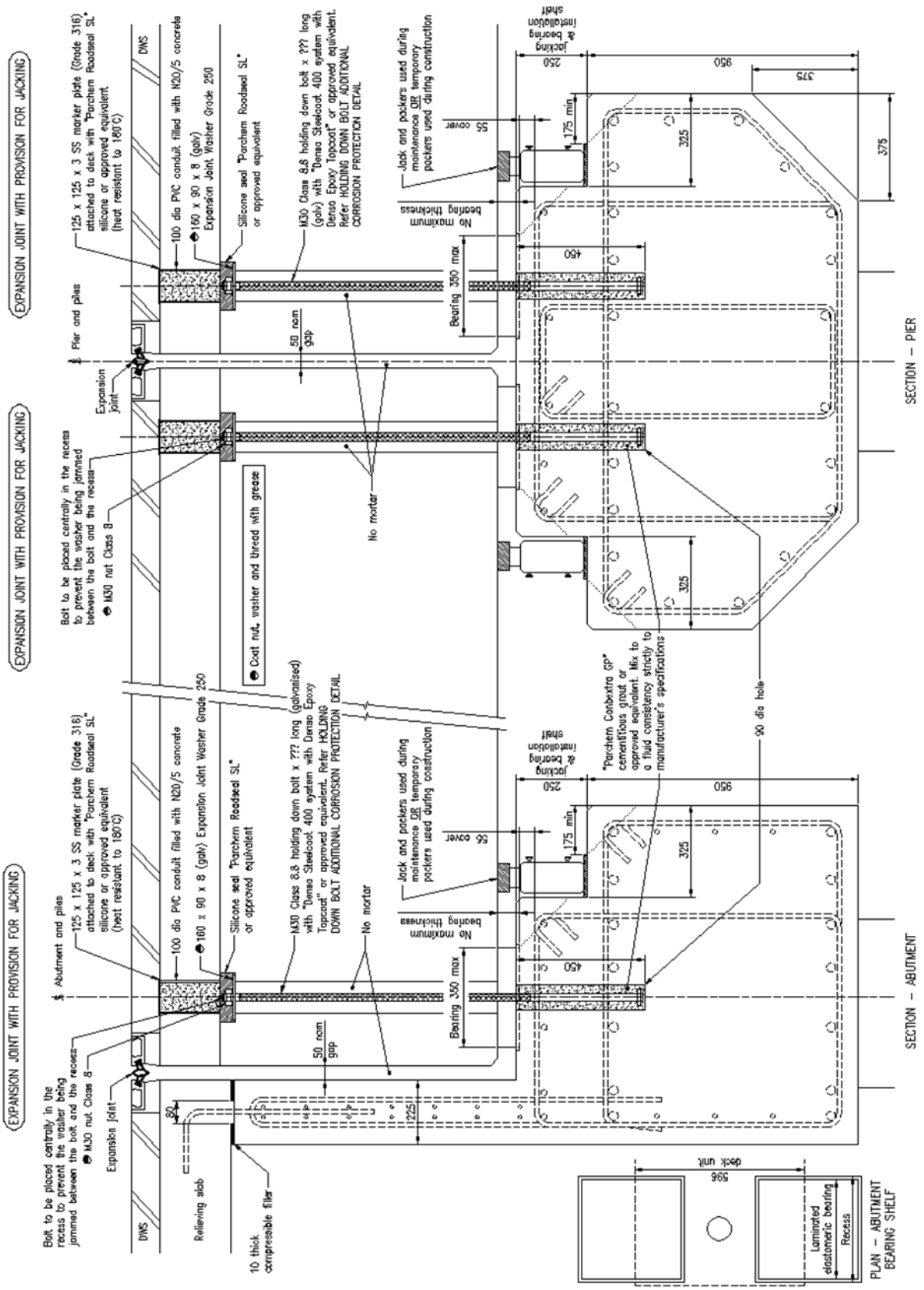


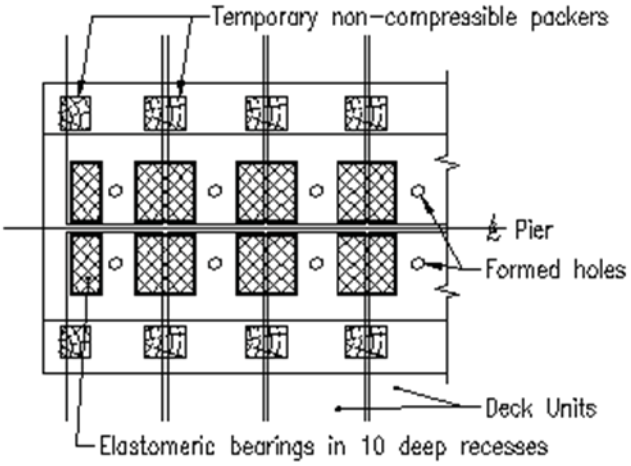
Figure 13.4-7 Expansion Abutment and Pier Joints – DWS and Concrete Deck on Deck Units



13.5 Deck Unit Erection Construction Procedure

A construction procedure for the bearing installation and deck unit erection shall be shown on the General Arrangement drawings. For an example of the required details, refer Figure 13.5-1 *Deck Unit Erection*. Note that the construction procedure shown may need to be modified to suit the specific bridge design.

Figure 13.5-1 Deck Unit Erection



CONSTRUCTION PROCEDURE

1.. Install non-compressible temporary packers on top of the headstock, positioned to support the deck units. Packers to be of sufficient strength to support the weight of the deck units, and of such a height under load that the soffit of the deck units will clear the top of the bearings by 1mm at the closest point.
2.. When compressible filler is required around the formed holes, attach it with epoxy adhesive.
3.. Immediately prior to installing the deck units, apply an approved epoxy to the top surface of the bearing. The epoxy shall have a cured compressive strength of not less than 60MPa. The thickness of the epoxy is determined by the hog/grade of the deck units. The thickness shall not exceed 5mm.
4.. The deck units shall then be lowered into position and supported on the packers. Any excess epoxy squeezed out shall be removed before it has set.
5.. If the epoxy sets before completion of this operation, the deck unit shall be lifted off and all contact surfaces cleaned before repeating the process.
6.. Put holding down bolts in place before grouting in the bolts to the required depth.
7.. Place the fibre washers and silicone in the top of the holding down bolt holes before installing the washers and nuts.
8.. After the epoxy has fully cured over a period of not less than 48 hours, the packers shall be removed without dislodging the deck unit

DECK UNIT ERECTION
PIERS SHOWN – ABUTMENTS SIMILAR
NTS

13.6 Girder Bridge Jacking

Girders are always located on bearings rather than cement mortar seating, therefore provision must be made for jacking to replace the bearings should the need arise. Usually girder bridges are designed with cross girders and the jacks shall be placed underneath them for lifting purposes. Therefore, jacking shelves are not needed.

13.7 Abutment Protection

The type of abutment protection shall be decided by the Design Engineer. Where the abutment protection is subject to flooding, assistance should be sought from a Hydraulics Engineer.

Workplace Health and Safety legislation requires that abutment protection be designed to allow safe access to the abutments for inspection and maintenance. When additional abutment protection is added to a bridge that is being widened, it may not be possible to comply with the Legislation, though every effort shall be made to do so.

Refer to TMR Standard Drawing 1536 which provides the selection criteria for various forms of abutment protection. A risk assessment shall determine which safety features are required to be incorporated into the abutment protection design.

For an explanation of the details required on the General Arrangement drawings refer Chapter 11 – *General Arrangement Drawings, Detailed Design General Arrangement Drawings*.

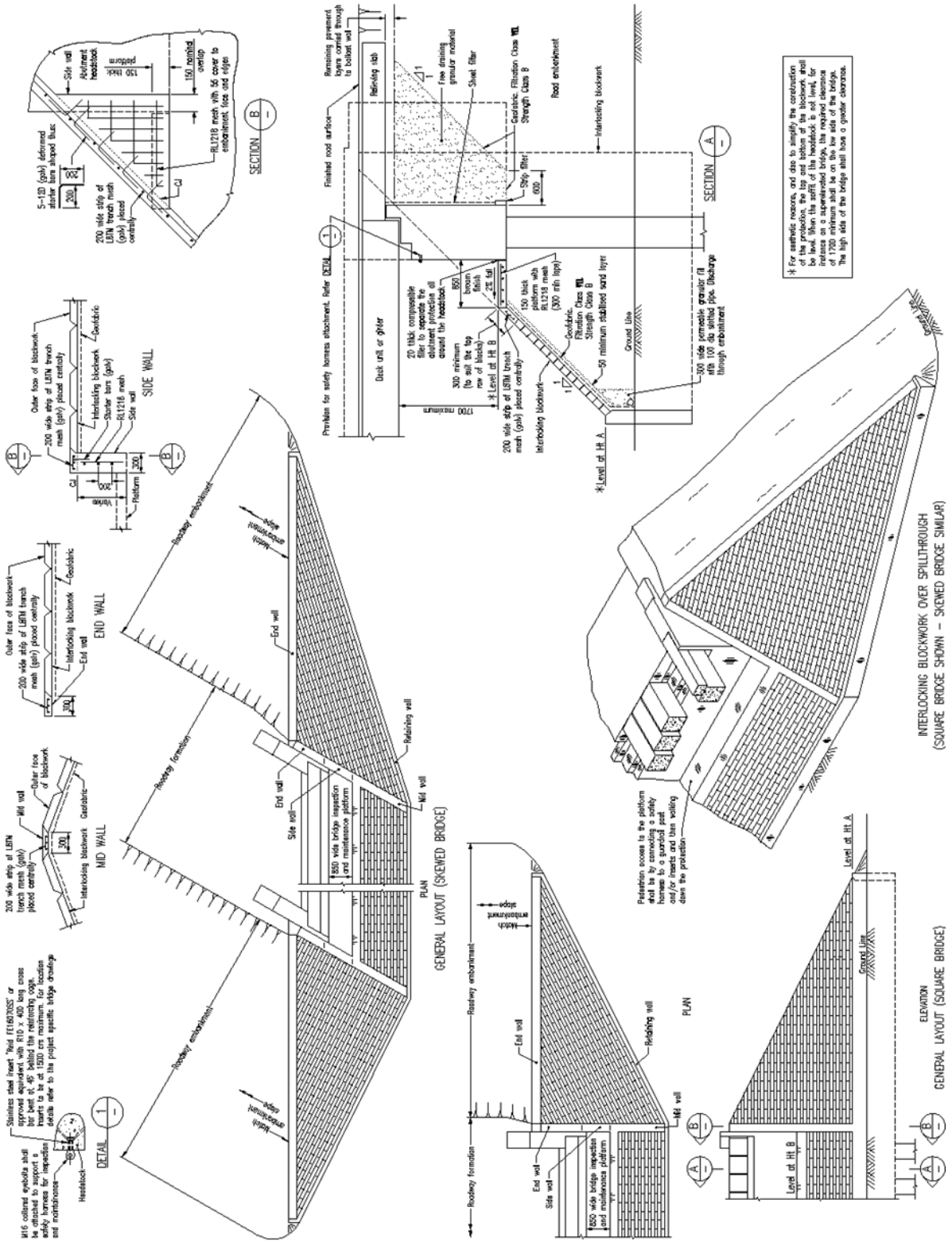
Interlocking Blockwork

Abutment Protection Type 6 – Interlocking Blockwork over Spillthrough, has traditionally been used for overpass bridges in residential areas where it has been placed on a one on one slope at the front of the embankment. Due to WH&S and stability requirements this slope shall be flattened to one on 1.5. Because overpass embankments are so tall, the one on 1.5 slope adds considerable length to the bridge. Therefore, reinforced soil structures are generally preferred to blockwork.

For an example of blockwork details, refer Figure 13.7-1 *Example Interlocking Blockwork Details*. Note that the embankment slope at the front of the abutment is shown at one on one in the example, however the current design criteria requires one on 1.5. The retaining wall around the base of the blockwork shall be designed to accommodate the earth pressure, and the force from the blockwork.

An inspection and maintenance platform shall be provided 1700 mm below from the underside of the deck unit/girder. This distance will suit an average sized person. The platform shall be 850 mm wide and broom finished to improve traction when walking on the platform.

Figure 13.7-1 Example Interlocking Blockwork Details

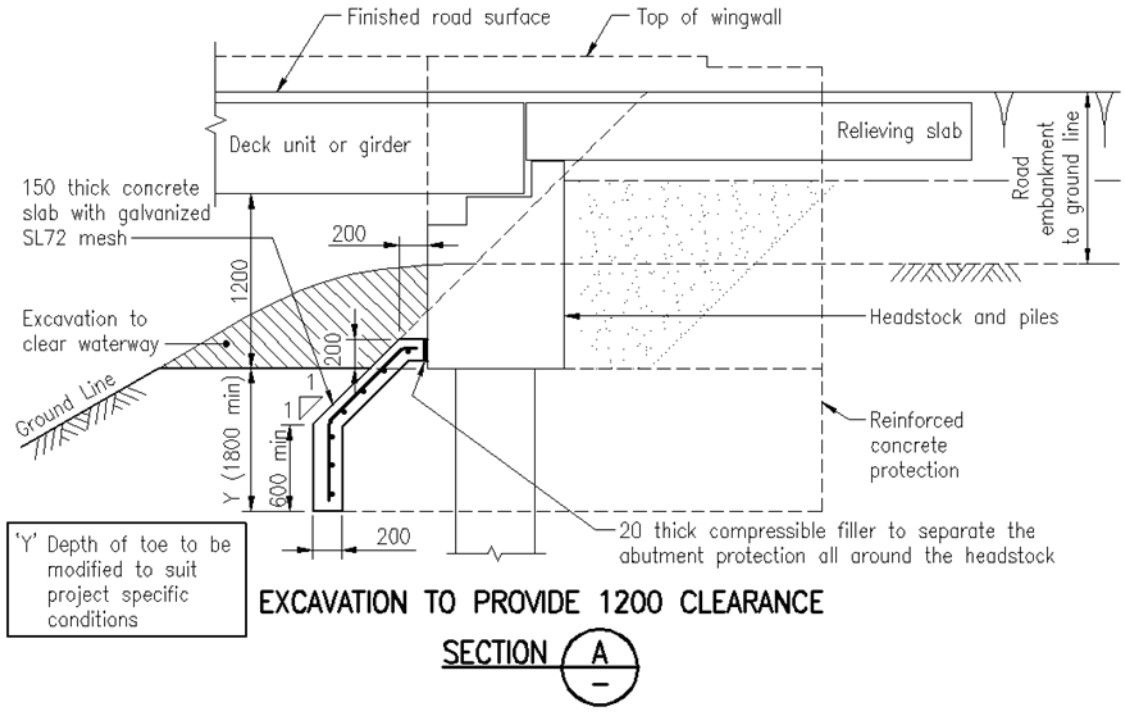


Minimum Inspection Height of 1200 mm

When the soffit of the abutment headstock is below ground, a minimum of 1200 mm headroom shall be provided underneath the deck units/girders to allow practical inspection and maintenance of the

abutments. To achieve this, the waterway shall be cleared to soffit height. On both sides of the bridge the excavation to clear waterway shall transition up to the natural ground line at one on four. Refer Figure 13.7-2 *Minimum Inspection Height of 1200 mm*. This figure is extracted from TMR Standard Drawings 1542.

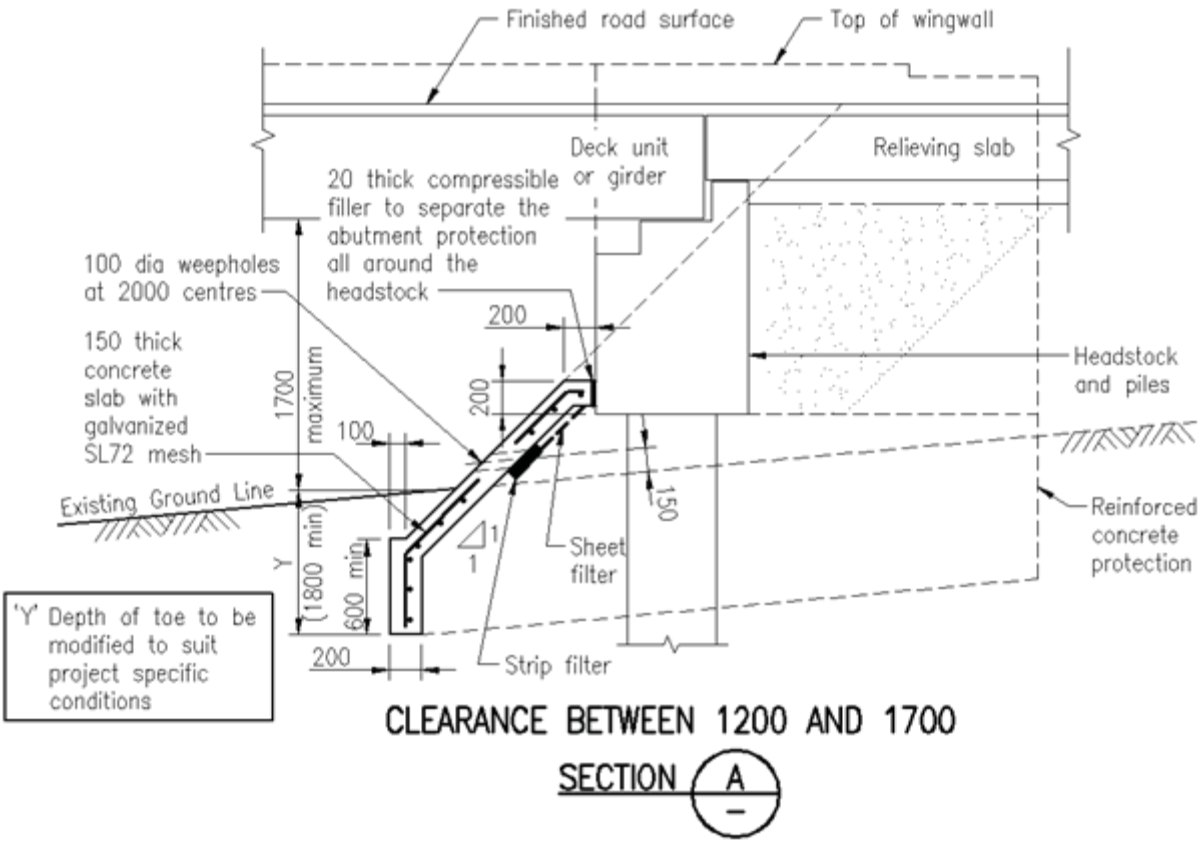
Figure 13.7-2 Minimum Inspection Height of 1200 mm



Inspection Height between 1200 mm and 1700 mm

When the distance from the underside of the deck unit/girder to the ground at the foot of the abutment protection spillthrough is between 1200 mm and 1700 mm, an inspection and maintenance platform shall not be provided. Refer Figure 13.7-3 *Inspection Height between 1200 mm and 1700 mm*. This figure is extracted from TMR Standard Drawings 1542.

Figure 13.7-3 Inspection Height between 1200 mm and 1700 mm

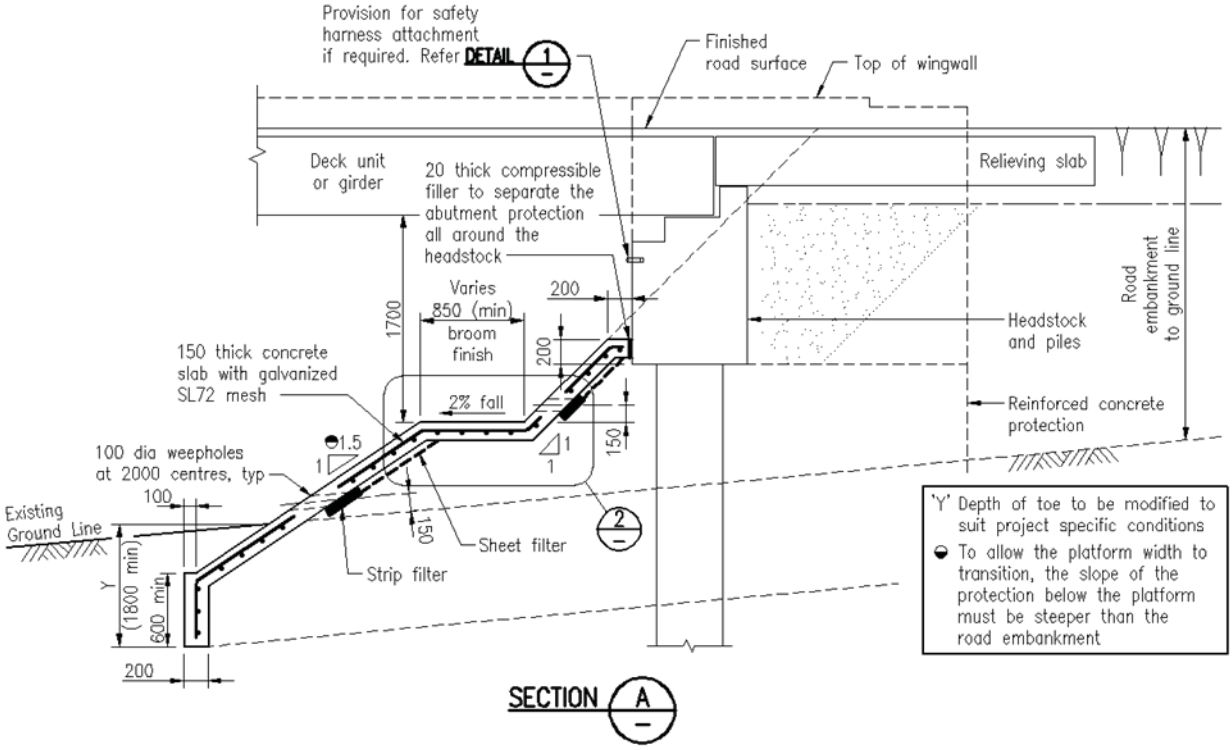


Maximum Inspection Height of 1700 mm

When the distance from the underside of the deck unit/girder to the ground at the foot of the abutment protection spillthrough is greater than 1700 mm, an inspection and maintenance platform shall be provided. This height will suit an average sized person. The platform shall be 850 mm wide. When the platform is constructed with concrete it shall be broom finished to improve traction when walking on the platform.

When an inspection and maintenance platform is provided, the slope of the abutment protection spillthrough below the platform shall be no steeper than one on 1.5. Refer Figure 13.7-4 *Maximum Inspection Height of 1700 mm*. This figure is extracted from TMR Standard Drawings 1543.

Figure 13.7-4 Maximum Inspection Height of 1700 mm

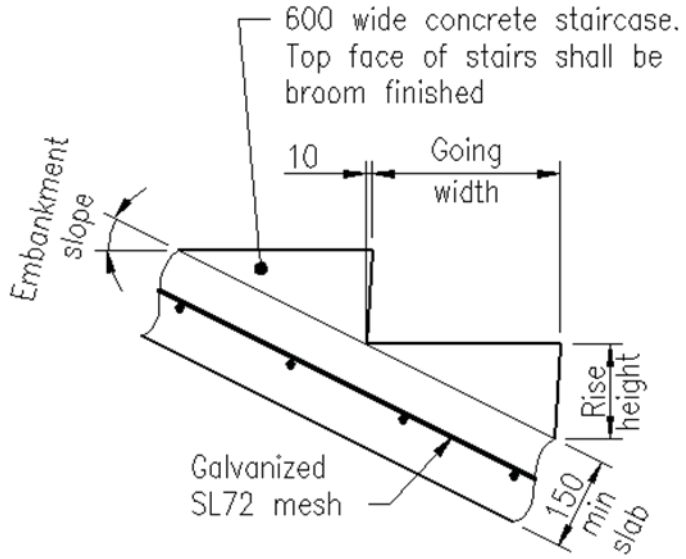


Staircase Access to the Inspection & Maintenance Platform

When the slope of the roadway embankment is steeper than one on two, a 600 mm wide stairs may be provided to allow safe access to the inspection and maintenance platform. The stairs may provide access from either above or below the platform.

The staircase slab shall be 150 mm thick minimum for standard abutment protection types 1 and 2 and 300 mm thick for type 4. Refer Figure 13.7-5 *Staircase details*. This figure is extracted from TMR Standard Drawings 1543.

Figure 13.7-5 Staircase details



STAIR DIMENSIONS

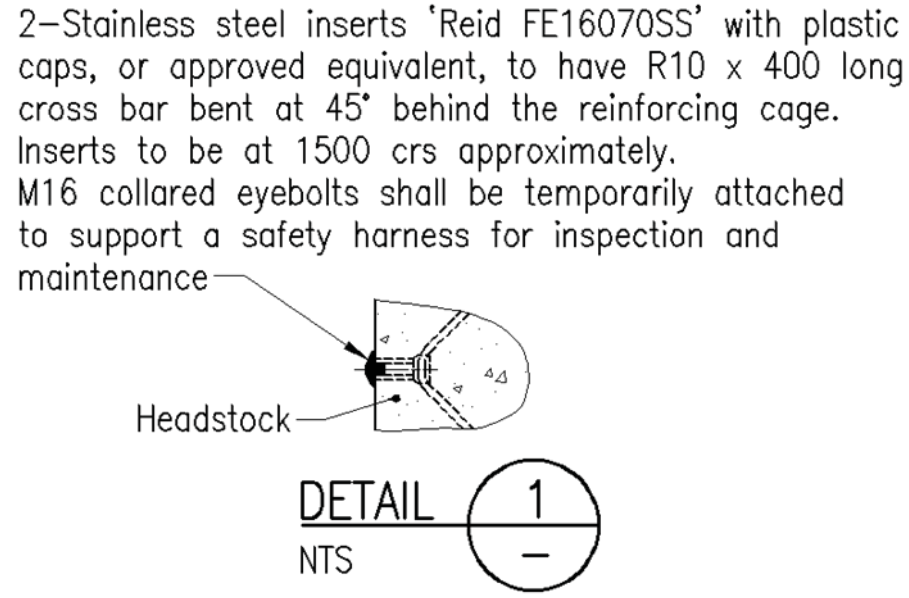
★ Embankment slope	Going width	Rise height
1 on 1 (45°)	215	215
1 on 1.5 (33.7°)	263	175
1 on 2 (26.6°)	300	150

★ Refer to AS 1657 for step details for alternate slopes

Inserts for Safety Harness Attachment

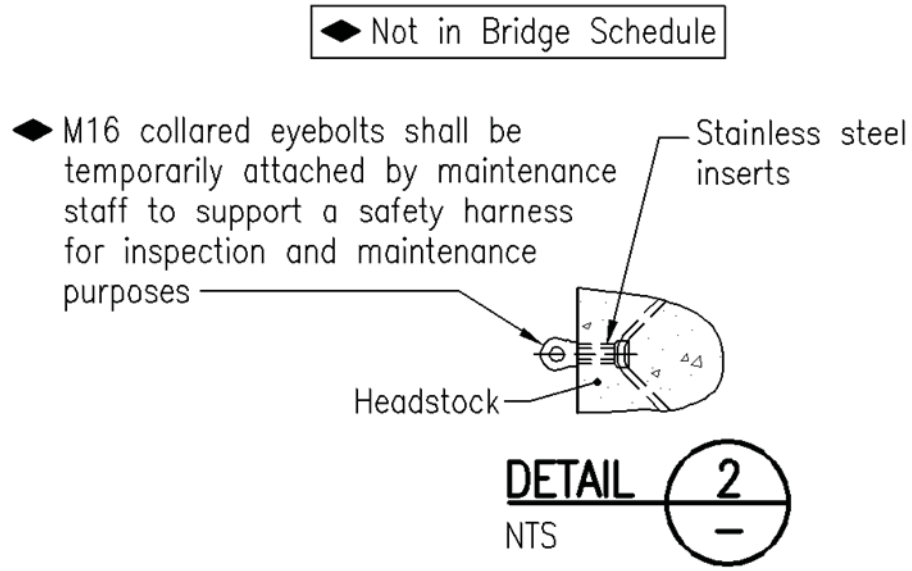
If it is likely a person would be injured by falling from the inspection and maintenance platform, inserts shall be cast into the headstock to allow for attachment of a safety harness. The inserts shall be spaced a maximum of 1500 mm. The details shown in Figure 13.7-6 *Insert Details at Abutments* shall be shown on the abutment drawings.

Figure 13.7-6 *Insert Details at Abutments*



The details shown in Figure 13.7-7 shall be shown on the inspection and maintenance drawing. It refers back to the abutment drawing for the insert details.

Figure 13.7-7 Eyebolt Details



13.8 Bridge Jacking, Inspection and Maintenance Drawing

A Design Report is required for every bridge design. This must include a section on future bridge inspection and maintenance. Whenever there is provision for future bridge jacking, an inspection and maintenance drawing shall be included in the set of bridge drawings. The following details are required on the drawing:

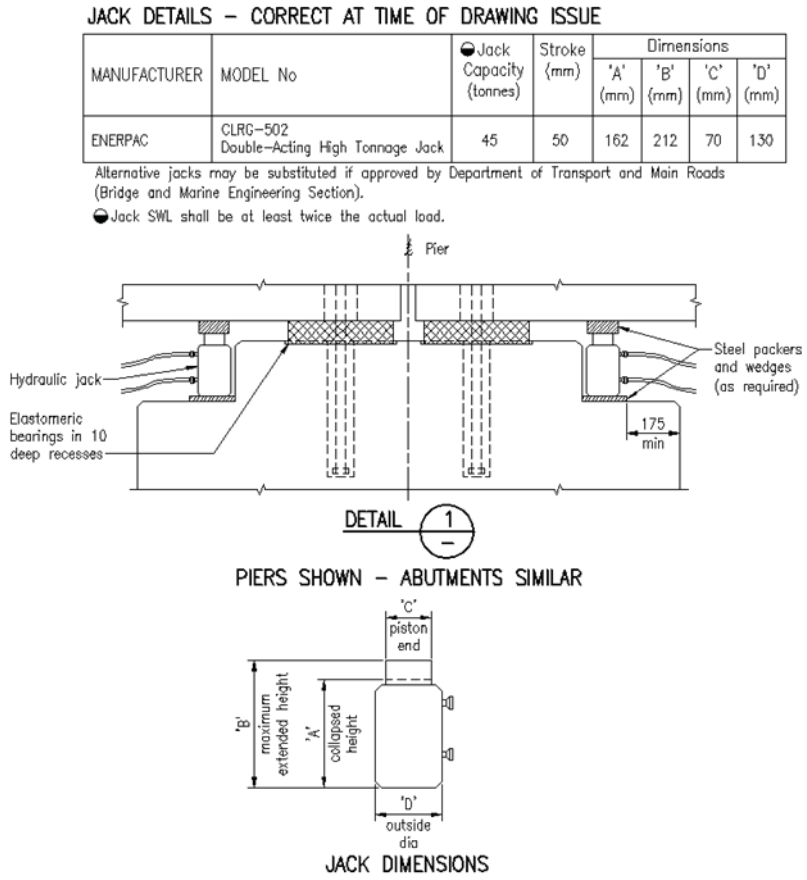
- Jack details including dimensions, manufacturer, model number, capacity and stroke
- Jack locations during jacking
- Details for how the bridge headstocks can be accessed for inspection and maintenance
- Design criteria for the lifting process
- Site preparation and access
- Bearing replacement procedure.

For examples refer Appendix A *Example Bridge Jacking, Inspection and Maintenance Drawings*.

Jack Details

Refer Figure 13.8-1 *Example Jack Details*.

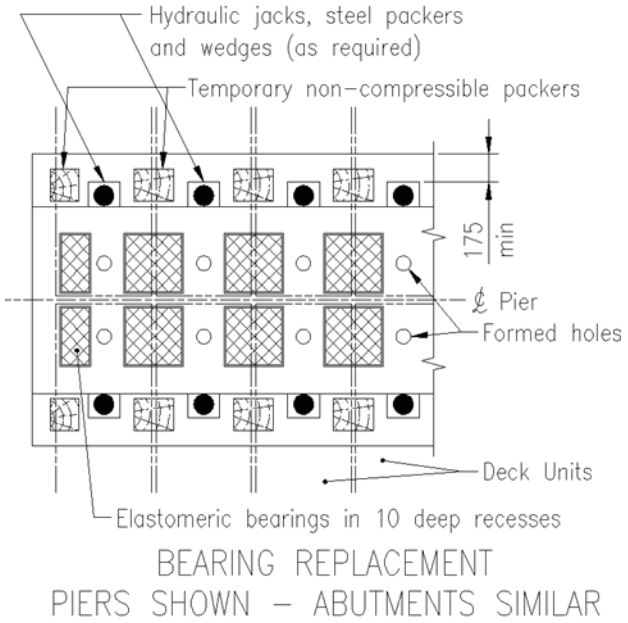
Figure 13.8-1 Example Jack Details



Jack Locations

Jacks must always be placed vertically. Steel packers and wedges are used to accommodate any slope on the bearing shelf and any hog/grade of the deck units. The drawing shall show the location of the jacks. Refer Figure 13.8-2 *Example Jack Location Details*.

Figure 13.8-2 Example Jack Location Details



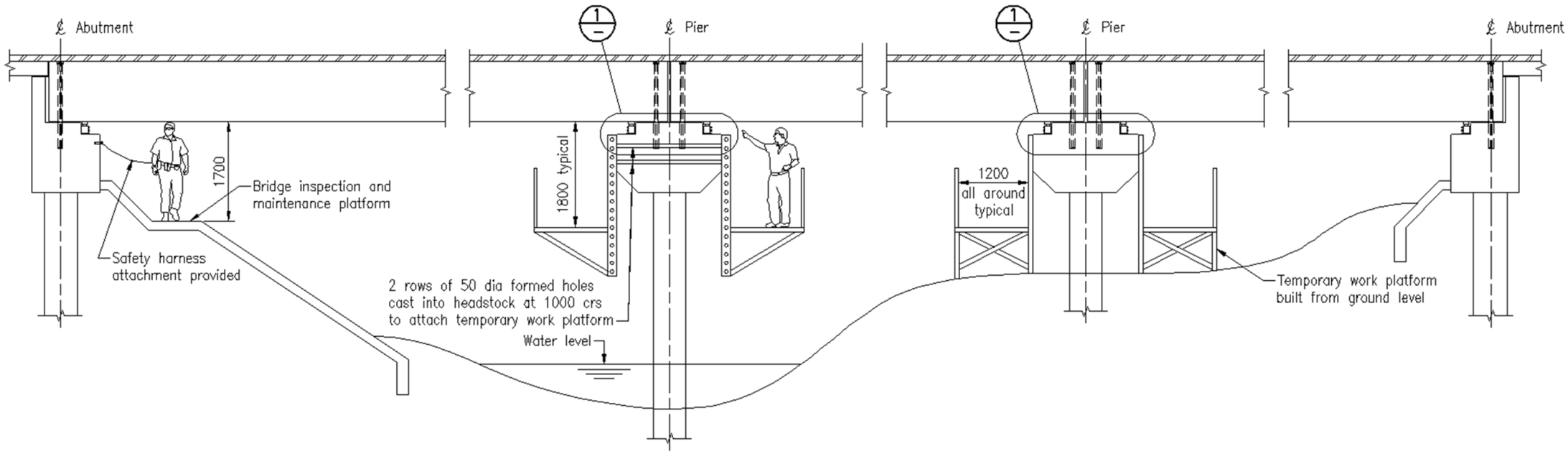
Bearing Replacement Procedure

The drawing shall explain the design assumptions for lifting, site preparation and access, and the bearing replacement procedure. For examples refer Appendix A *Example Bridge Jacking, Inspection and Maintenance Drawings*. Take care to reword the notes to suit the bridge in question.

Inspection and Maintenance Access

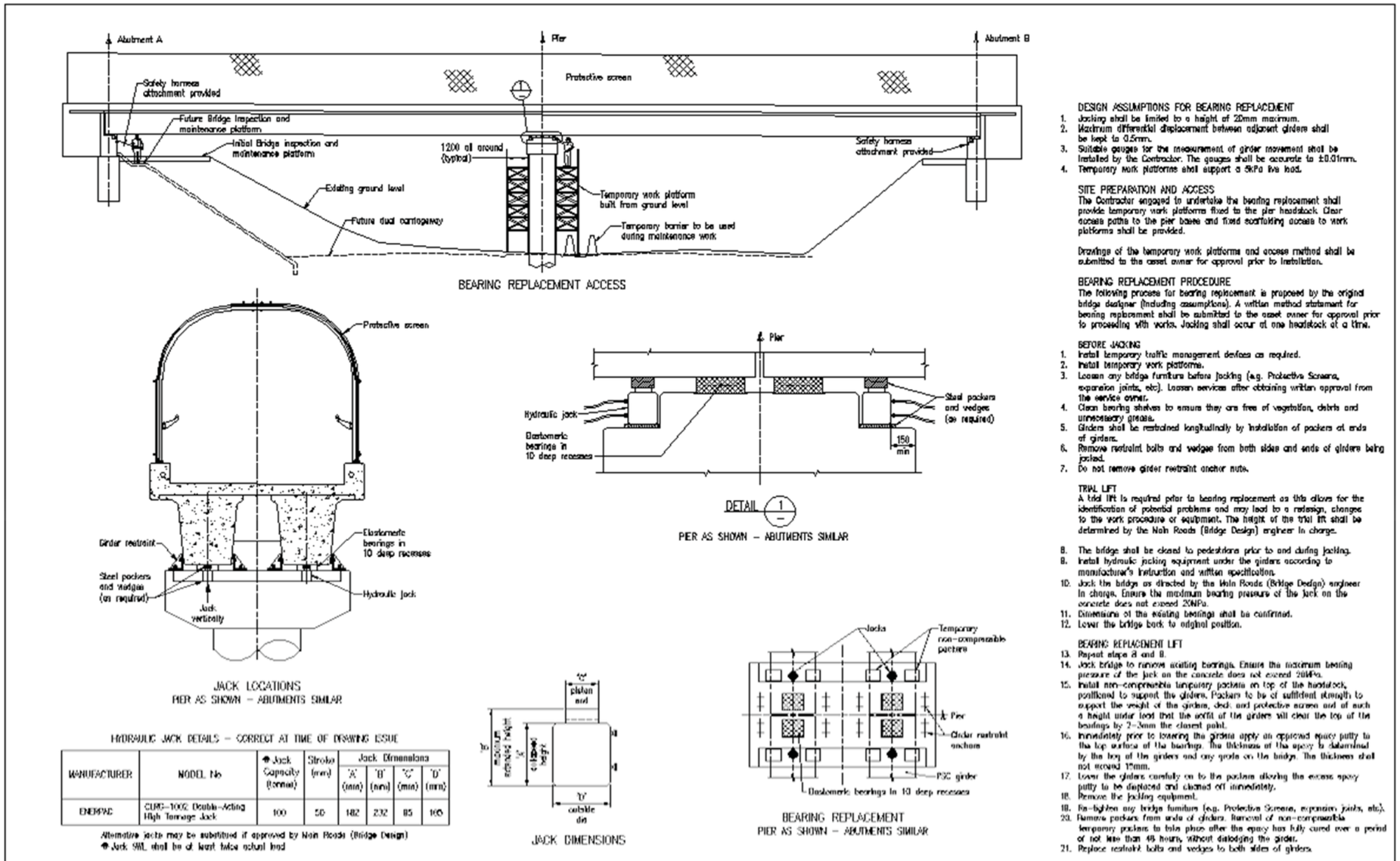
As explained in 13.7 *Abutment Protection*, a risk assessment shall determine which safety features are needed for inspection and maintenance to be done safely. The drawing shall show how access to the bridge can be done safely. Refer Figure 13.8-3 *Example Bearing Replacement Access Details*.

Figure 13.8-3 Example Bearing Replacement Access Details



Appendix A – Example Bridge Jacking, Inspection and Maintenance Drawings

Appendix A – Example Bridge Jacking, Inspection and Maintenance Drawings – Sheet 1



HYDRAULIC JACK DETAILS – CORRECT AT TIME OF DRAWING ISSUE

MANUFACTURER	MODEL No	◆ Jack Capacity (tonne)	Stroke (mm)	Jack Dimensions 'A' (min)	'B' (mm)	'C' (min)	'D' (mm)
ENERPAC	CLRG-100C Double-Acting High Tonnage Jack	100	50	182	232	85	165

Alternative jacks may be substituted if approved by Main Roads (Bridge Design)
◆ Jack SWL shall be at least twice actual load

DESIGN ASSUMPTIONS FOR BEARING REPLACEMENT
1. Jacking shall be limited to a height of 20mm maximum.
2. Maximum differential displacement between adjacent girders shall be kept to 0.5mm.
3. Suitable gauges for the measurement of girder movement shall be installed by the Contractor. The gauges shall be accurate to ±0.01mm.
4. Temporary work platforms shall support a 5kPa live load.

SITE PREPARATION AND ACCESS
The Contractor engaged to undertake the bearing replacement shall provide temporary work platforms fixed to the pier headstock. Clear access paths to the pier bases and fixed scaffolding access to work platforms shall be provided.

Drawings of the temporary work platforms and access method shall be submitted to the asset owner for approval prior to installation.

BEARING REPLACEMENT PROCEDURE
The following process for bearing replacement is proposed by the original bridge designer (including assumptions). A written method statement for bearing replacement shall be submitted to the asset owner for approval prior to proceeding with works. Jacking shall occur at one headstock at a time.

BEFORE JACKING
1. Install temporary traffic management devices as required.
2. Install temporary work platforms.
3. Loosen any bridge furniture before jacking (e.g. Protective Screens, expansion joints, etc). Loosen services after obtaining written approval from the service owner.
4. Clean bearing shelves to ensure they are free of vegetation, debris and unnecessary grease.
5. Girders shall be restrained longitudinally by installation of packers at ends of girders.
6. Remove restraint bolts and wedges from both sides and ends of girders being jacked.
7. Do not remove girder restraint anchor nuts.

TRIAL LIFT
A trial lift is required prior to bearing replacement as this allows for the identification of potential problems and may lead to a redesign, changes to the work procedure or equipment. The height of the trial lift shall be determined by the Main Roads (Bridge Design) engineer in charge.

8. The bridge shall be cleared to pedestrians prior to and during jacking.
9. Install hydraulic jacking equipment under the girders according to manufacturer's instruction and written specification.
10. Jack the bridge as directed by the Main Roads (Bridge Design) engineer in charge. Ensure the maximum bearing pressure of the jack on the concrete does not exceed 20MPa.
11. Dimensions of the existing bearings shall be confirmed.
12. Lower the bridge back to original position.

BEARING REPLACEMENT LIFT
13. Repeat steps 8 and 9.
14. Jack bridge to remove existing bearings. Ensure the maximum bearing pressure of the jack on the concrete does not exceed 20MPa.
15. Install non-compressible temporary packers on top of the headstock, positioned to support the girders. Packers to be of sufficient strength to support the weight of the girders, deck and protective screen and of such a height under load that the soffit of the girders will clear the top of the bearings by 2–3mm the closest point.
16. Immediately prior to lowering the girders apply an approved epoxy putty to the top surface of the bearings. The thickness of the epoxy is determined by the log of the girders and any voids on the bridge. The thickness shall not exceed 12mm.
17. Lower the girders carefully on to the packers allowing the excess epoxy putty to be displaced and cleaned off immediately.
18. Remove the jacking equipment.
19. Re-tighten any bridge furniture (e.g. Protective Screens, expansion joints, etc).
20. Remove packers from ends of girders. Removal of non-compressible temporary packers to take place after the epoxy has fully cured over a period of not less than 48 hours, without dislodging the girder.
21. Replace restraint bolts and wedges to both sides of girders.

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS 5100:2004 | DESIGN LOADING: 8 kPa | EARTHQUAKE ZONE: ECQ–1 | BRIDGE TYPE: RC Deck on PSC Girders | BIS No:

Revisions	Verified	Date	Checked	Associated Job Nos	Survey Data
A Original Issue A3				Ancillary Org Nos	Horiz. Datum; Azimuth Datum; Height Datum; Survey Books

CAD FILES: [BRIDGE]\MARYBRP_A3.DWG | DRAWING: 12 WIDE BW/GREY – MARYBRP.TBP | DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE | STRUCTURES DIVISION

Scales: NOT TO SCALE

MARYBOROUGH CITY
BRUCE HIGHWAY (MARYBOROUGH – GIN GIN)

Reference Points: Preceding RP | Dist. to start of Job (km) | From start to end of Job | From end to Following RP | Following RP

BRUCE HIGHWAY PEDESTRIAN OVERPASS AT MARYBOROUGH
MAINTENANCE AND INSPECTION DETAILS

Drawing	Design	Design Review	Engineering Certification
T. Morris Checked	A. Graduate Verified	G. Swalling RPEQ No. 1080	03/05/2009
M. Haldane	A. Graduate		

For scheme approval status refer Dwg. No. 485094 (01 of 01)

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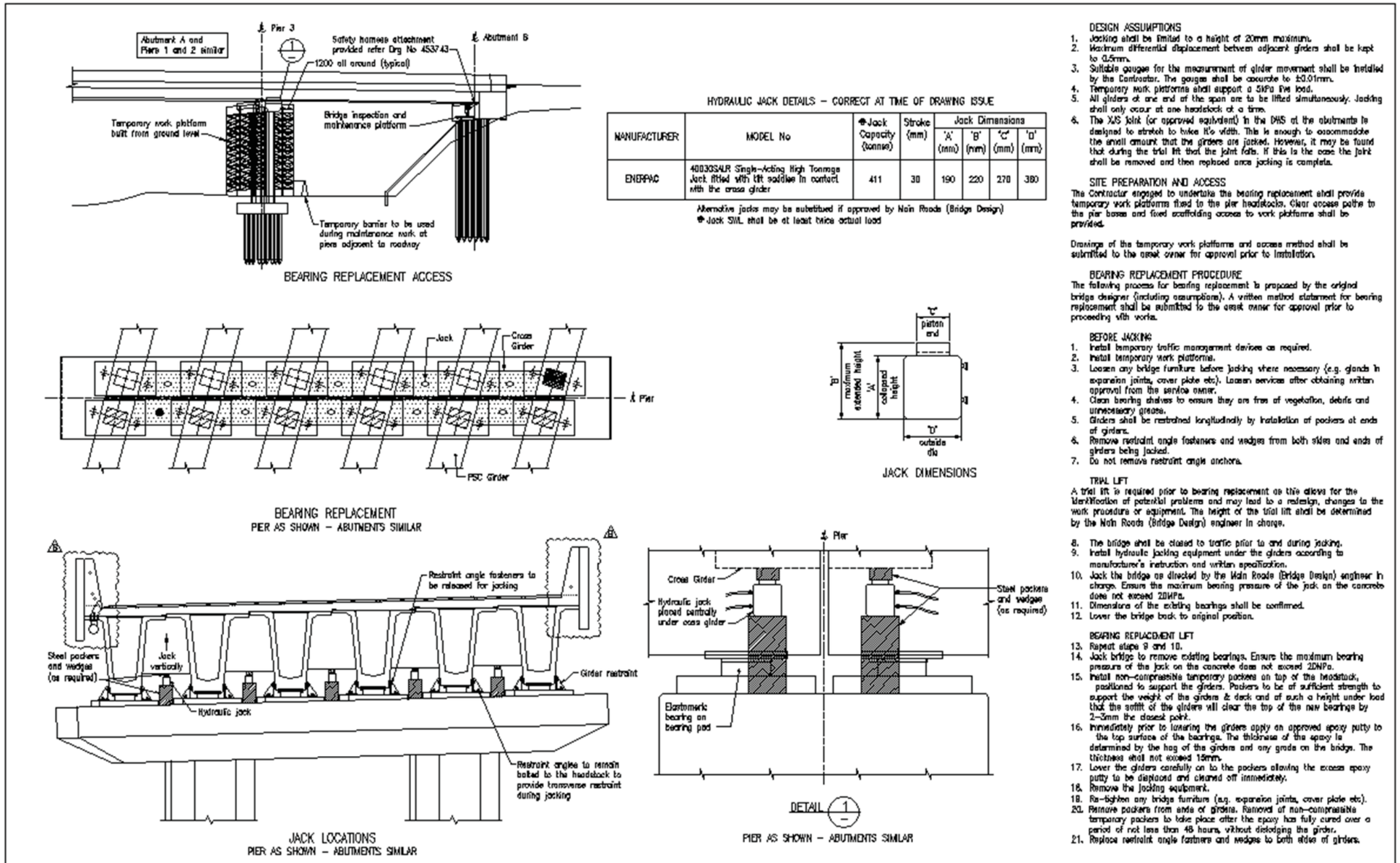
Queensland Government Department of Main Roads

Job No.	D148LGSH015
Contract No.	ENG 19–08/09
Drawing No.	453891 A
Series Number	BR01–MD–18 of 18

MRR Detail 111/091

Appendix A – Example Bridge Jacking, Inspection and Maintenance Drawings – Sheet 2



Appendix A – Example Bridge Jacking, Inspection and Maintenance Drawings – Sheet 3